

### ABSTRACT

A multi-level waveguide to transmit light through a series of substrates. The multi-level waveguide is made up of stacked substrates, each containing a two dimensional array of transparent material filled vias. Transparent materials such as optical fiber, cladding, and gas may be used to provide a pathway for light. Optionally, a  
5     conductive layer may be deposited on a substrate in the multi-level waveguide. The conductive layer can then interact with the multi-level waveguide through light detecting devices such as photodetectors.